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## **Typhoid Fever** **Typhoid Carrier** **Chronic Typhoid Carrier** **(*Salmonella* Serotype Typhi)**

### **Overview**<sup>(1,2)</sup>

For a more complete description of Typhoid Fever, refer to the following texts:

- Control of Communicable Diseases Manual (CCDM).
- Red Book, Report of the Committee on Infectious Diseases.

### **Typhoid Fever Case Definition**<sup>(3)</sup>

#### ***Clinical description***

An illness caused by *Salmonella* serotype Typhi that is often characterized by insidious onset of sustained fever, headache, malaise, anorexia, relative bradycardia, constipation or diarrhea, and nonproductive cough. However, many mild and atypical infections occur. Carriage of *S. serotype Typhi* may be prolonged.

#### ***Laboratory criteria for diagnosis***

Isolation of *S. serotype Typhi* from blood, stool, or other clinical specimen

#### ***Case classification***

*Confirmed*: a clinically compatible case that is laboratory confirmed

*Probable*: a clinically compatible case that is epidemiologically linked to a confirmed case in an outbreak


#### ***Comment***

Isolation of the organism is required for confirmation. Serologic evidence alone is not sufficient for diagnosis. Asymptomatic carriage should **not** be reported as typhoid fever but rather *Salmonella* Typhi (typhoid carriers - e.g. convalescent typhoid carrier, chronic typhoid carrier).

### **Typhoid Carrier Case Definition**<sup>(4)</sup>

#### ***Case classification***

Any person whose feces or urine contains typhoid bacilli (*Salmonella* serotype Typhi) and is not ill shall be considered a typhoid carrier. If a typhoid carrier has had typhoid fever within the past twelve (12) months s/he shall be considered a convalescent typhoid carrier.

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## **Chronic Typhoid Carrier Case Definition**<sup>(4)</sup>

### ***Case classification***

If a typhoid carrier continues to have typhoid bacilli in his/her feces or urine for more than twelve (12) months after having typhoid fever or in the absence of a history of typhoid fever, s/he shall be considered a chronic typhoid carrier.

## **Information Needed for Investigation**

- **Verify the diagnosis.** What laboratory tests were conducted and what were the results?
- **Contact the Regional Communicable Disease Coordinator** immediately after verifying the diagnosis.
- **When investigating gastrointestinal illness of unknown etiology,** see the Outbreak Investigation, Acute Gastroenteritis section in the CDIRM.
- **Establish the extent of illness.** Determine if household, traveling companions, or other close contacts are, or have been ill, by contacting the health care provider, patient or family member.
- **Contact the Bureau of Child Care** if cases are associated with child care.

## **Case/Contact Follow Up And Control Measures**

Determine the source of infection:

- Does the case or a member of the case's household attend a child care center or nursery school?
- Does the case or a member of the case's household work as a food handler or health care provider?
- Has the case traveled to an endemic area?
- Have there been other cases linked by time, place or person?

### **Control Measures**


See the Typhoid Fever section of the Control of Communicable Diseases Manual (CCDM), "Control of patient, contacts and the immediate environment".

See the *Salmonella* Infections section of the Red Book.

### **Typhoid Fever:**

Individuals who have typhoid fever should be excluded from handling food, providing patient or child care until released from supervision.

To release a typhoid fever case from supervision:

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- There must be three (3) consecutive negative stool specimens collected 24 hours apart.
- The specimens must be collected at least 48 hours after completing any antibiotic treatment.
- The specimens must be collected at least one (1) month after onset of illness.

If any one of the cultures is positive, repeat cultures at intervals of one month during the 12 month period following onset until three (3) consecutive negative cultures are obtained.<sup>(1)</sup>

#### **Typhoid Carriers:** <sup>(4)</sup>

Individuals who are Typhoid Carriers should be excluded from handling food, providing patient or child care until released from supervision. Typhoid Carriers may prepare food for their immediate family only, while under supervision.

To release a Typhoid Carrier from supervision:


- There must be three (3) consecutive negative authenticated stool specimens collected one (1) month apart. If schistosomiasis is suspected, three (3) authenticated stool specimens, and three (3) urine specimens shall be tested, all six specimens should be negative.
- The specimens must be collected at least 48 hours after completing any antibiotic treatment.
- At least one of the three (3) specimens should be obtained by purging.<sup>(1)</sup>

#### **Chronic Typhoid Carriers:** <sup>(4)</sup>

Individuals who are Chronic Typhoid Carriers should be excluded from handling food, providing patient or child care until released from supervision. Chronic Typhoid Carriers may prepare food for their immediate family only, while under supervision.

To release a Chronic Typhoid Carrier from supervision:

- There must be six (6) consecutive negative specimens collected under the supervision of the Health Officer.
- The specimens must be collected one (1) month apart.
- For intestinal carriers, the specimens should be stool. For urinary carriers, the specimens should be urine.
- The Health Officer must sign a release in the form of a written dated statement, indicating that the patient has met the requirements for release from supervision and is no longer classified as a chronic typhoid carrier. One copy of the statement shall be given to the carrier, one (1) retained by the local health department, and one (1) forwarded to the Region Health Office having jurisdiction, or forwarded to the Department of Health and Senior Services.

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See 19 CSR 20-22.010 “Supervision of Typhoid Carriers”

**Vaccination:**

- Immunization is not routinely recommended in the United States. Routine administration of typhoid vaccine is of limited value for family, household, and nursing contacts that have been exposed to active cases; it should be considered for those who may be exposed to carriers.<sup>(1)</sup>
- Current practice is to immunize those subject to exposure from occupation, travel to endemic areas, those living in areas of high endemicity, and household members of known carriers.<sup>(1)</sup>

**Laboratory Procedures**

**Specimens:**

In acute illness, the organism is normally isolated from feces or blood. In the carrier state, the organism may be isolated from feces or urine.

**Enteric cultures:**

Collect fecal specimens in Cary-Blair media using the Enteric Specimen collection kit supplied by the SPHL. Specimens should be shipped refrigerated.

**Urine cultures:**

Contact the SPHL or the Regional Communicable Disease Coordinator for urine specimen collection procedures.


**Other:**

Febrile agglutination does not have diagnostic value and should not be used to diagnose typhoid fever. Because antibiotic resistance occurs in *Salmonella* serotype Typhi, antibiotic susceptibility tests should be performed. Antibiotic susceptibility is not performed by the SPHL.

**Reporting Requirements**

Typhoid fever is a Category I disease and shall be reported to the Department of Health and Senior Services by telephone, facsimile, or other rapid communication within 24 hours of suspected or established diagnosis:

1. For all reported cases, complete a “Disease Case Report” (CD-1).
2. Complete CDC 52.5 “Typhoid Fever Surveillance Report”, for confirmed cases (not required for any typhoid carriers).
3. Entry of the complete CD-1 into the MOHSIS database negates the need for the paper CD-1 to be forwarded to the Regional Health Office.

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4. Complete CD 3A “Typhoid Carrier Agreement” on typhoid chronic/typhoid carriers.
5. All suspected cases of typhoid fever, or a typhoid carrier, or a chronic typhoid carrier must be reported to the Regional Communicable Disease Coordinator as soon as possible.
6. Send the completed secondary investigation form(s) to the Regional Health Office.
7. All outbreaks or “suspected” outbreaks must be reported as soon as possible (by phone, fax or e-mail) to the Regional Communicable Disease Coordinator. This can be accomplished by completing the initial outbreak report form.
8. Within 90 days from the conclusion of an outbreak, submit the final outbreak report to the Regional Communicable Disease Coordinator.

### **References**

1. Chin, James, ed. “Typhoid Fever.” Control of Communicable Diseases Manual, 17<sup>th</sup> ed. Washington, D.C.: American Public Health Association. 2000: 535-541.
2. American Academy of Pediatrics. “*Salmonella* Infections.” In: Pickering, LK, ed. 2000 Red Book: Report of the Committee on Infectious Diseases. 25<sup>th</sup> ed. Elk Grove Village, IL. 2000: 501-506.
3. Centers for Disease Control and Prevention. Case Definitions for Infectious Conditions Under Public Health Surveillance. MMWR 1997; 46 (RR-10): 41-42.
4. Missouri Laws accompanied by Department of Health and Senior Services Rules July 1999 19 CSR 20-22.010 Supervision of Typhoid Carriers.

### **Other Sources Of Information**

1. Evans, AS and Brachman, PS, ed. Bacterial Infections of Humans Epidemiology and Control, 3<sup>rd</sup> Ed. New York: Plenum, 1998: pages 839-858.
2. Donowitz, LG, ed. Infection Control in the Child Care Center and Preschool, 4<sup>th</sup> ed., Baltimore, MD, Williams & Wilkins, 1999: 264-267.

### **Web Sites**

National Center for Infectious Diseases, Centers for Disease Control and Prevention  
Typhoid Fever

[http://www.cdc.gov/ncidod/dbmd/diseaseinfo/typhoidfever\\_g.htm](http://www.cdc.gov/ncidod/dbmd/diseaseinfo/typhoidfever_g.htm) (29 April 2003)

# **Typhoid Fever**

## **(*Salmonella* Serotype Typhi)**

### **FACT SHEET**

#### **What is typhoid fever?**

Typhoid fever is an infection of the intestinal tract and occasionally the bloodstream caused by the bacteria, *Salmonella* serotype Typhi. It is an uncommon disease in the United States with less than 10 cases occurring in Missouri each year. Most of the cases in Missouri are acquired during foreign travel to underdeveloped countries. Outbreaks are rare.

#### **Who gets typhoid fever?**

Anyone can get typhoid fever but the greatest risk exists to travelers visiting countries where the disease is common. Occasionally, local cases can be traced to exposure to a person who is a chronic carrier.

#### **How is typhoid fever spread?**

Typhoid germs are passed in the feces and, to some extent, the urine of infected people. The germs are spread by eating or drinking water or foods contaminated by feces from the infected individual.

#### **What are the symptoms of typhoid fever?**

Symptoms may be mild or severe and may include fever, headache, constipation or diarrhea, rose-colored spots on the trunk and an enlarged spleen and liver. Relapses are common. Fatalities are less than 1 percent with antibiotic treatment.

#### **How soon do symptoms appear?**

Symptoms generally appear one to three weeks after exposure.

#### **For how long can an infected person carry the typhoid germ?**

The carrier stage varies from a number of days to years. Only about 3 percent of cases go on to become lifelong carriers of the germ and this tends to occur more often in adults than in children.

#### **How is typhoid fever treated?**

You will probably be given an antibiotic to treat the disease. Three commonly prescribed antibiotics are ampicillin, trimethoprim-sulfamethoxazole, and ciprofloxacin. Persons given antibiotics usually begin to feel better within 2 to 3 days, and deaths rarely occur.

However, persons who do not get treatment may continue to have fever for weeks or months, and as many as 20% may die from complications of the infection.

If you are being treated for typhoid fever, it is important to do the following:

- Take the prescribed antibiotics for as long as the doctor has asked you to take them.
- Wash your hands carefully with soap and water after using the bathroom, and do not prepare or serve food for other people.
- Have your doctor perform stool cultures to ensure that no *S. serotype Typhi* bacteria remain in your body.

### **Should an infected person be excluded from work or school?**

In general, individuals infected with *Salmonella* serotype Typhi may return to work or school when their diarrhea has stopped, but they must be sure to carefully wash their hands after using the bathroom.

Special precautions are indicated for food handlers, health care workers and child care workers and children who attend child care. Food handlers, health care workers and child care workers must not work directly with food or patients and children until they have three (3) negative stool tests for *Salmonella* serotype Typhi. Children infected with *Salmonella* serotype Typhi may not return to child care until they have three (3) negative stool tests for *Salmonella* serotype Typhi.

### **Is there a vaccine for typhoid?**

A vaccine is available but is generally reserved for people traveling to underdeveloped countries where significant exposure may occur. Strict attention to food and water precautions while traveling to such countries is the most effective preventive method.

**Missouri Department of Health and Senior Services  
Section for Communicable Disease Prevention  
Phone: (866) 628-9891 or (573) 751-6113**



## TYPHOID FEVER SURVEILLANCE REPORT

CDC NO.:   
(1-5)

Form Approved OMB No. 0920-0009

### Instructions:

— Please complete this form only for new, symptomatic, culture-proven cases of typhoid fever. —

### DEMOGRAPHIC DATA

1. Reporting State: <input type="text"/> <input type="text"/> (6-7)	2. First three letters of patient's last name: <input type="text"/> <input type="text"/> <input type="text"/> (8-10)	3. Date of birth: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> (11-16) Mo. Day Yr. or Age: <input type="text"/> <input type="text"/> (17-18) (in years)
4. Sex: (19) 1 <input type="checkbox"/> Male 2 <input type="checkbox"/> Female	5. Does the patient work as a foodhandler? (20) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk.	6. Citizenship: (21) 1 <input type="checkbox"/> U.S. 8 <input type="checkbox"/> Other: _____ 9 <input type="checkbox"/> Unk.

### CLINICAL DATA

7. Was the patient ill with typhoid fever? (fever, abdominal pain, headache, etc) (22) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk.	If Yes, give date of onset of symptoms: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> (23-28) Mo. Day Yr.	8. Was the patient hospitalized? (29) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk.	If Yes, how many days was the patient hospitalized? <input type="text"/> <input type="text"/> (30-31) Days	9. Outcome of case: (32) 1 <input type="checkbox"/> Recovered 2 <input type="checkbox"/> Died 9 <input type="checkbox"/> Unk.
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### LABORATORY DATA

10. Date <i>Salmonella typhi</i> first isolated: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> (33-38) Mo. Day Yr.	Site(s) of isolation: (check all that apply) (39) 1 <input type="checkbox"/> Blood 2 <input type="checkbox"/> Stool 3 <input type="checkbox"/> Gall bladder 8 <input type="checkbox"/> Other (specify): _____ (40-55)
11. Was antibiotic sensitivity testing performed on this (these) isolate(s) at the laboratory? (Please contact the clinical laboratory for this information) (60) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk.	
If Yes, was the organism resistant to: • Ampicillin: .....(57) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Not tested • Chloramphenicol: .....(58) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Not tested • Trimethoprim-sulfamethoxazole: .....(59) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Not tested • Fluoroquinolones (e.g., Ciprofloxacin): .....(60) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Not tested	

### EPIDEMIOLOGIC DATA

12. Did this case occur as part of an outbreak? (two or more cases of typhoid fever associated by time and place) (61) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk.	
13. Did the patient receive typhoid vaccination (primary series or booster) within five years before onset of illness? (62) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk.	If Yes, indicate type of vaccine received: • Standard killed typhoid shot (Wyeth-Ayerst): .....(63) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk. Year received: <input type="text"/> <input type="text"/> (64-65) • Oral Ty21a or Vivotif (Berna) four pill series: .....(66) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk. (67-68) • VICPS or Typhim Vi shot (Pasteur Merieux): .....(69) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk. (70-71)
14. Did the patient travel or live outside the United States during the 30 days before the illness began? (72) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk.	If Yes, please list in order the countries visited during the 30 days before the illness began: (other than the United States) 1. _____ (73-88) 3. _____ (105-120) 2. _____ (89-104) 4. _____ (121-136) Date of most recent return or entry to the United States: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> (137-142) Mo. Day Yr.
15. Was the purpose of the international travel: a.) Business? .....(143) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk. b.) Tourism? .....(144) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk. c.) Visiting relatives or friends? .....(145) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk. d.) Immigration to U.S.? .....(146) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk. e.) Other? .....(147) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk. (if other, specify): _____ (148-164)	
16. Was the case traced to a typhoid carrier? .....(165) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk. If Yes, was the carrier previously known to the health department? .....(166) 1 <input type="checkbox"/> Yes 0 <input type="checkbox"/> No 9 <input type="checkbox"/> Unk.	

### 17. Comments:


### 18. Name of Person Completing Form:

Address: \_\_\_\_\_

Telephone: ( \_\_\_\_\_ ) \_\_\_\_\_ Date: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_  
Mo. Day Yr.

— THANK YOU VERY MUCH FOR TAKING THE TIME TO COMPLETE THIS FORM —

Please send a copy to your STATE EPIDEMIOLOGY OFFICE and the  
FOODBORNE AND DIARRHEAL DISEASES BRANCH, CENTERS FOR DISEASE CONTROL AND PREVENTION,  
Mailstop A-38, Atlanta, Georgia, 30333. • Fax: (404) 639-2205

Missouri Department of Health  
TYPHOID CARRIER AGREEMENT

To Whom It May Concern

Date\_\_\_\_\_

I, \_\_\_\_\_ of \_\_\_\_\_

acknowledge that I am a typhoid carrier and that in order that I might be placed under modified isolation I hereby agree that:

- A. I will not at any time handle, prepare or cook any food or drink to be consumed by others than my immediate family.
- B. I will thoroughly wash my hands with soap and water after each visit to the toilet.
- C. I will not bathe in any public or private swimming pool.
- D. If my residence is not connected to a municipal sewage treatment system, I agree to have an onsite sewage treatment facility that complies with the minimum standards as determined by the Missouri Department of Health.
- E. I will notify the health officer or the local health department within one week of any change of address.
- F. I will submit such fecal and urine specimens as may be requested by the health officer or local health department.
- G. If I become ill and require hospital or institutional care, I will inform the superintendent or person in charge of such hospital or institution that I am a typhoid carrier.
- H. I understand that failure to abide by the provisions of this agreement subjects me to necessary enteric precautions as determined by the Missouri Department of Health.

Signed\_\_\_\_\_

Address\_\_\_\_\_

I. I have explained these provisions to \_\_\_\_\_ and in view of the above agreement I hereby grant permission for \_\_\_\_\_ to be in free communications with others as long as \_\_\_\_\_ complies with the conditions of the agreement.

Signed\_\_\_\_\_

Address\_\_\_\_\_

Name \_\_\_\_\_  
LAST FIRST MIDDLE

Date \_\_\_\_\_

Birth Date \_\_\_\_\_ Sex \_\_\_\_\_ Race \_\_\_\_\_

Date classified as carrier \_\_\_\_\_

Date carrier agreement signed \_\_\_\_\_

How discovered:

☐ Release specimens following typhoid

☐ Investigation of source of typhoid

☐ Transferred in from \_\_\_\_\_

☐ Other \_\_\_\_\_

Phage Type \_\_\_\_\_

Agglutinations \_\_\_\_\_

Laboratory examinations confirming carrier state:

[illegible]

Remarks: \_\_\_\_\_

## DISPOSITION

Released \_\_\_\_\_ Died \_\_\_\_\_ Moved from \_\_\_\_\_  
DATE DATE

Laboratory examinations for release as required by regulations: To \_\_\_\_\_ DATE \_\_\_\_\_

[illegible]

## FOLLOW-UP

[illegible]